Woodrow Wilson Bridge Project

Fish Protection Strategies on the $2.5B Woodrow Wilson Bridge Project

~Presented By~

Mike Baker, Environmental Manager

Potomac Crossing Consultants

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Presentation Topics:

- Overview of WWB Project
- Foundations Contract Challenges
- Resolution Strategies
- Application on Subsequent Contracts

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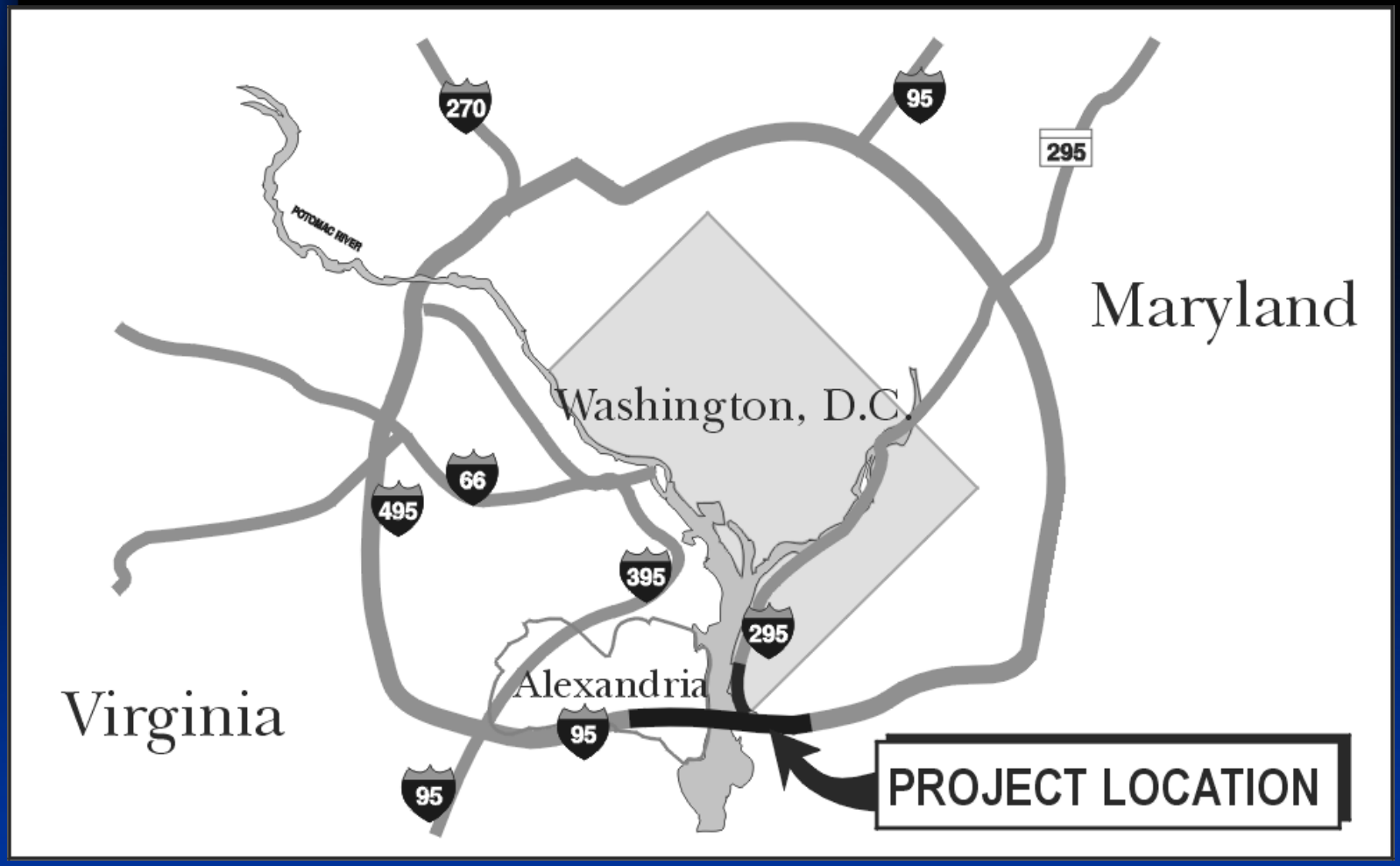
Woodrow Wilson Bridge Project Location



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Pre-existing Woodrow Wilson Bridge

- Opened 1961
- Anticipated Design Year Traffic Volume: 75,000
- 6 Lanes: Very narrow shoulders
- Current Traffic Volume: 195,000
- Anticipated Year 2020 Traffic Volume: 295,000

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Twin Parallel Draw Bridges

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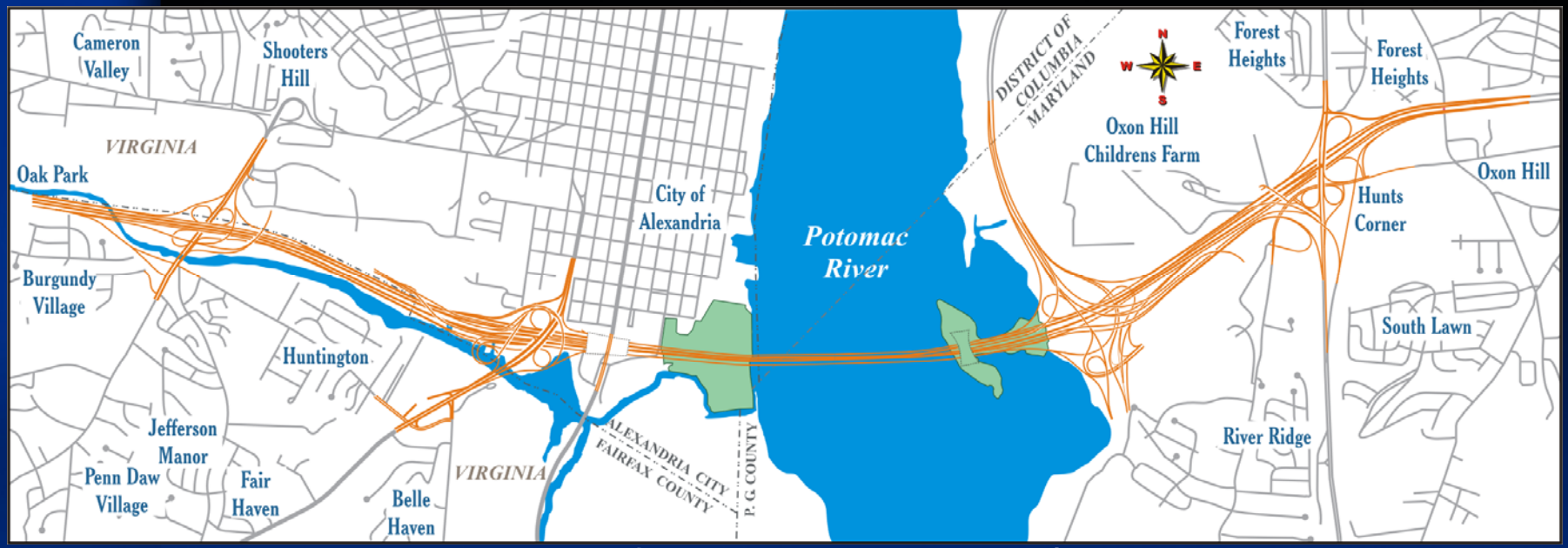
Environmental Features



Telegraph Road | US Route 1 | River Crossing | I-295 | MD-210

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Partnership

Department of Transportation, United States of America

VDOT Virginia Department of Transportation

SHA State Highway Administration — Driven to Excel — Maryland Department of Transportation

d. District Department of Transportation

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Woodrow Wilson Bridge Project Environmental Management

1. PCC's Environmental Management Team (EMT)
2. Independent Environmental Monitor
3. FHWA, MSHA, and VDOT Environmental Teams
4. Regulatory and Resource Agencies

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Long Road to Construction

1988 – Study initiated by federal government, Virginia, Maryland, District of Columbia

1996 – 12-lane facility and reconstruction of 4 adjacent interchanges is recommended

1997 – Final Environmental Impact Statement and ROD

1998 – Bridge design competition

2000 – Final Supplemental Environmental Impact Statement, ROD, permits, and finalization of ESA documents including a BA for the Shortnose Sturgeon.

October 19, 2000 – Start of Construction: commencement of river dredging.

2001 – Start of $125M MSHA Bridge Foundations Contract by joint venture of Tidewater/Kiewit/Clark (TKC).

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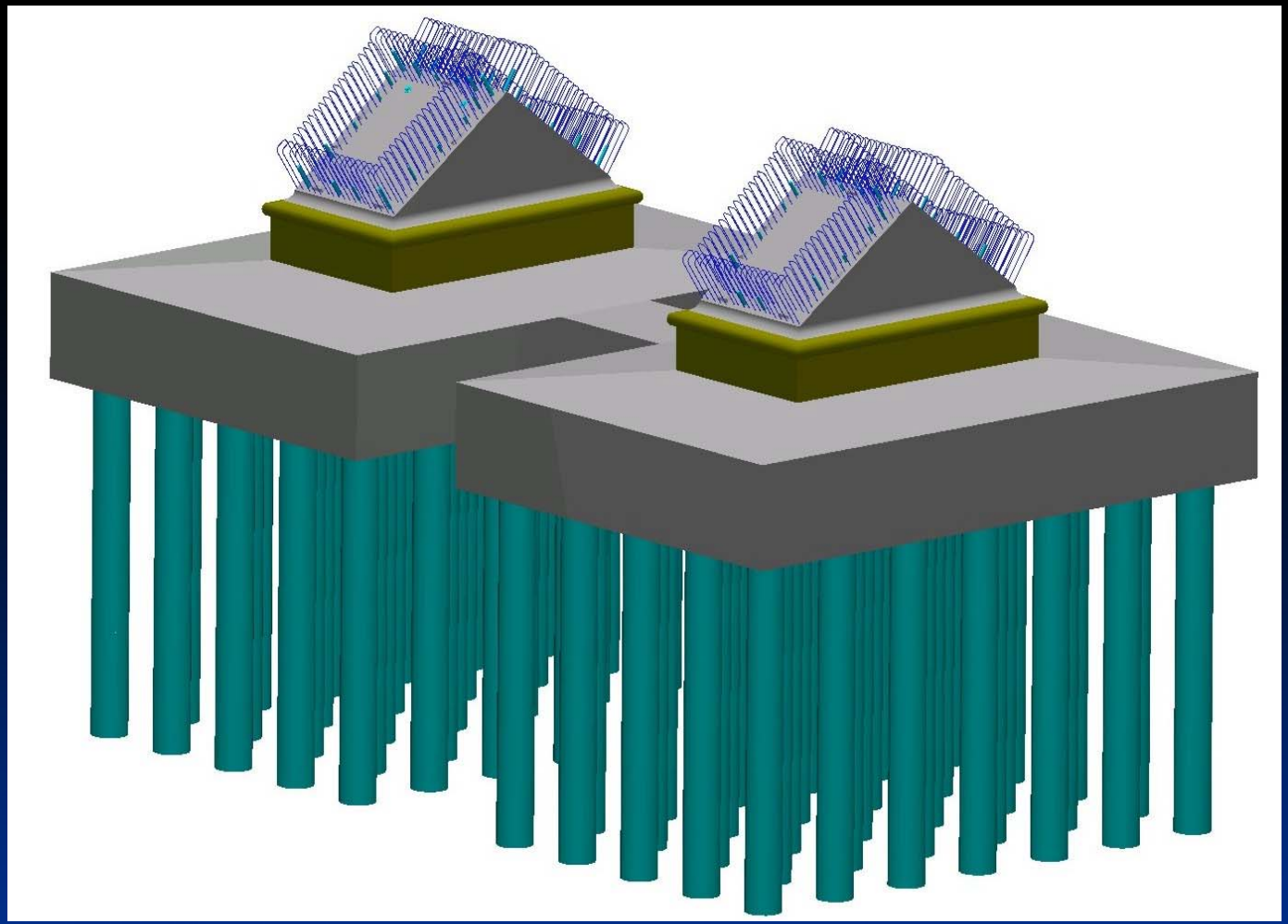

Graphic of typical foundation

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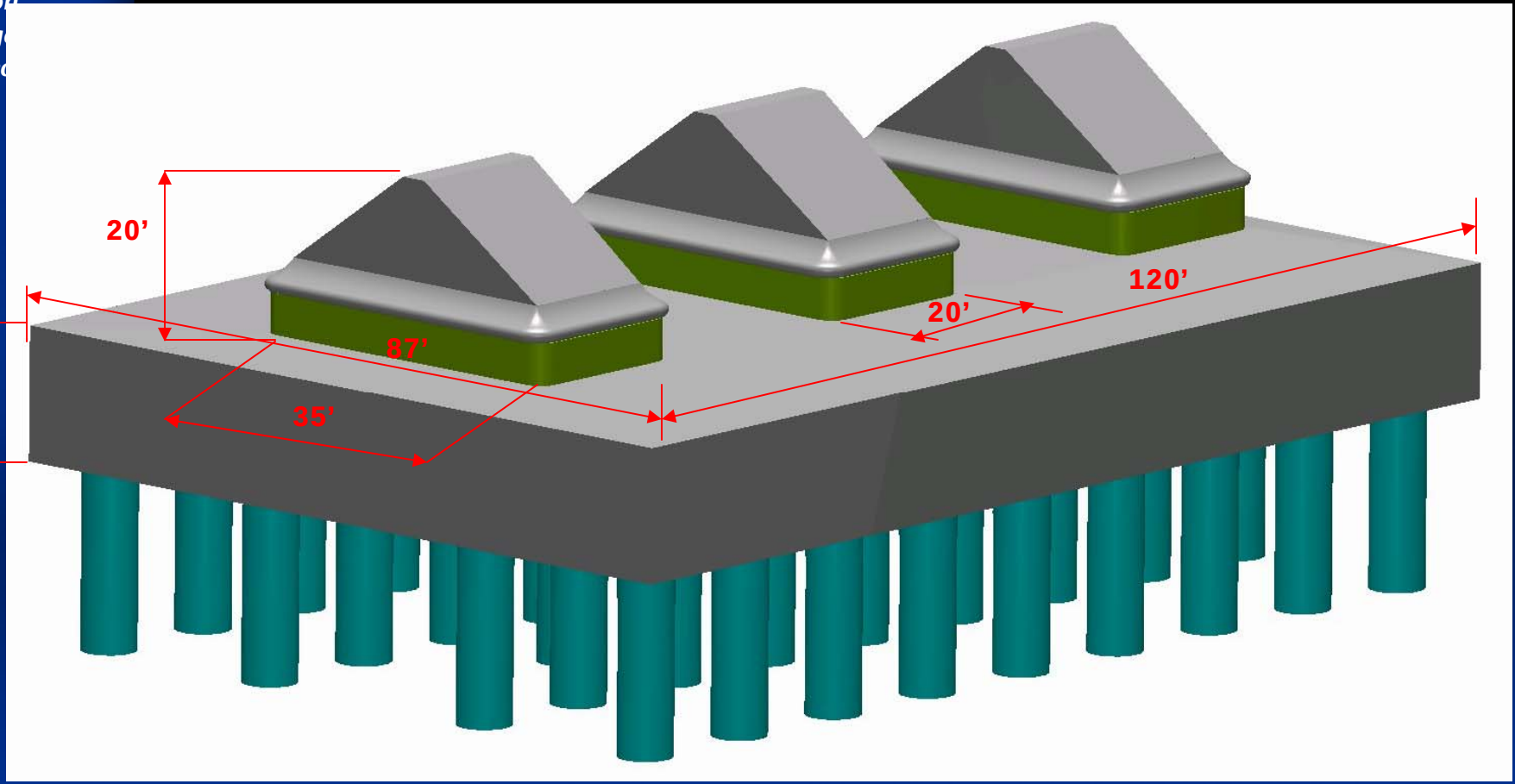
Bascule Pier Foundation

4 Required



Pile Facts

35 Steel Pipe Piles
- 6’ diameter
- 1 1/4” wall thickness
- 210’ long
- Weight 90 tons
- 1400 ton capacity

Concrete Facts
- Footing - 6500 C.Y.
- Pedestals - 365 C.Y. each
- High Performance Concrete

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V-Pier Construction

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Steel Girders

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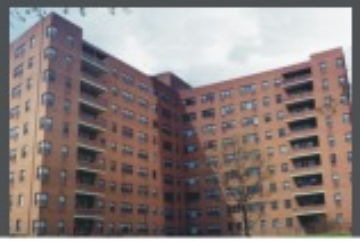
Pile Facts

Hunting Tower 100 Feet



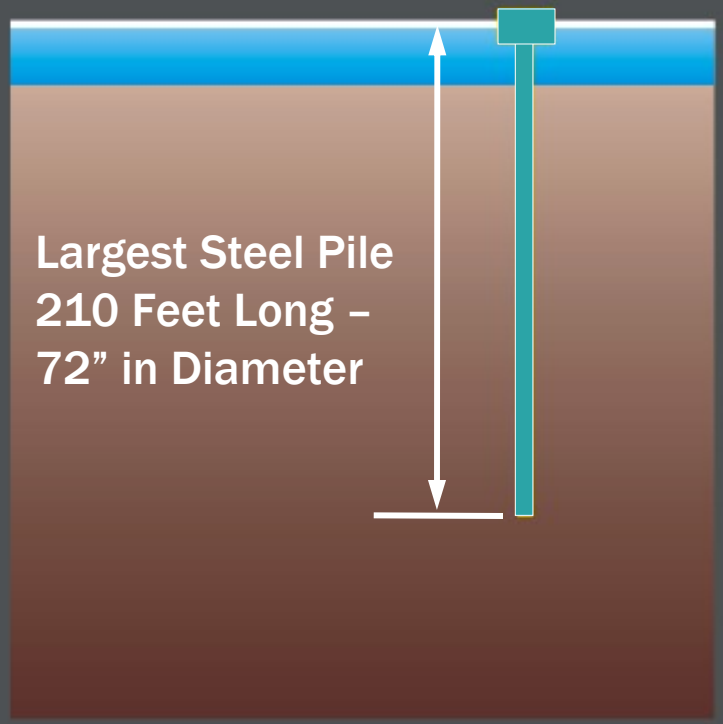
A Total of 640 Steel Pipe Piles:

@ 48" Dia.	38,200 LF
@ 54" Dia.	21,060 LF
@ 66" Dia.	25,420 LF
@ 72" Dia.	29,470 LF

= 22 Miles

A Total of 660 Concrete Piles:

26,500 LF = 5 miles



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Start of Pile Driving: August 2001

72” Diameter Pipe Piles at Draw Bridge

-Minor Fish Kill

-Engaged Agencies

- “Pile Tapping” proved sufficient

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October 2001: 300-ton Ringer Crane picking a 160 foot 48 inch steel pipe pile and requiring FAA clearance

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October 2001: Pile driving shifted to Maryland shoreline

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March 2002: Pile Driving returned to drawbridge/shipping channel area:

- Culmination of Factors: Fish Kill
- Re-engaged Agencies
- Established Thresholds
- Produced Daily Reports

- Attempted Alternative BMP's:
    - Time-of-Day / Tidal Cycles
    - Fish Finders
    - Turbidity Curtains
    - Considered scare tactics such as charges, horns, and sirens
    - Air bubble curtains

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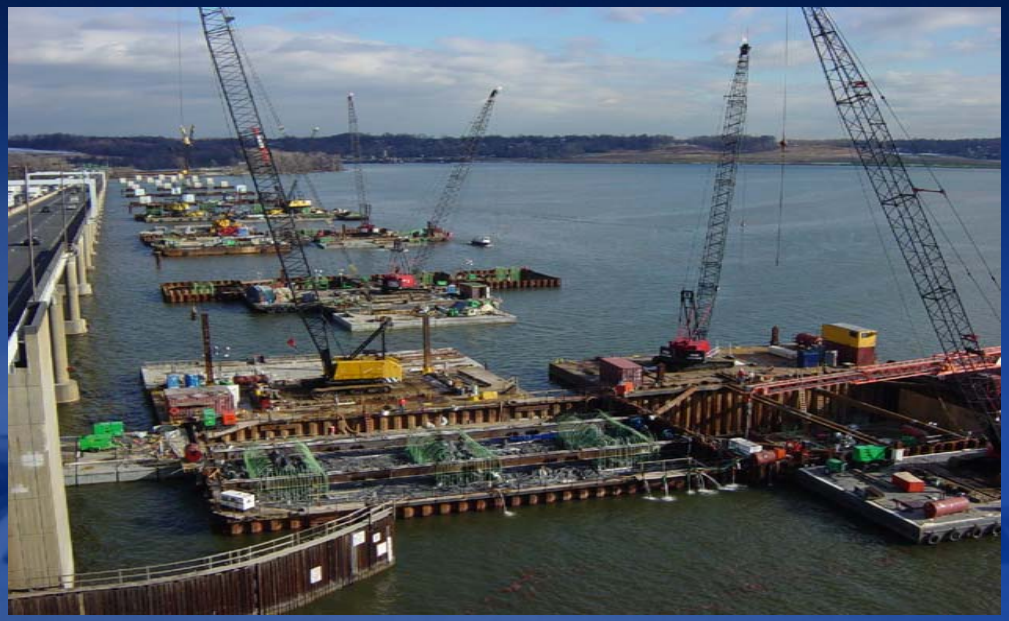
Summer 2002: Pile driving shifted back to mid-river and the Environmental Team retested the Air Bubble Curtain.

The Project engaged Hi Test Laboratories to conduct pressure wave monitoring.

- Digital oscilloscopes at various radii and depths
- 500,000 readings per second
- Developed systematic approach



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The Results:

-Max force exerted by driving 66” piles: 55 psi.

-Fish kill at 6 psi via visual observations.

-Cofferdams offered 15-50% reduction of energy.

- The air bubble curtain effectively reduced the energy to 2 psi when the bubble curtain was adequately contained.

-Pressure waves for pile driving are dissimilar to demolition detonations.

Bridge Demolition

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Bridge Demo

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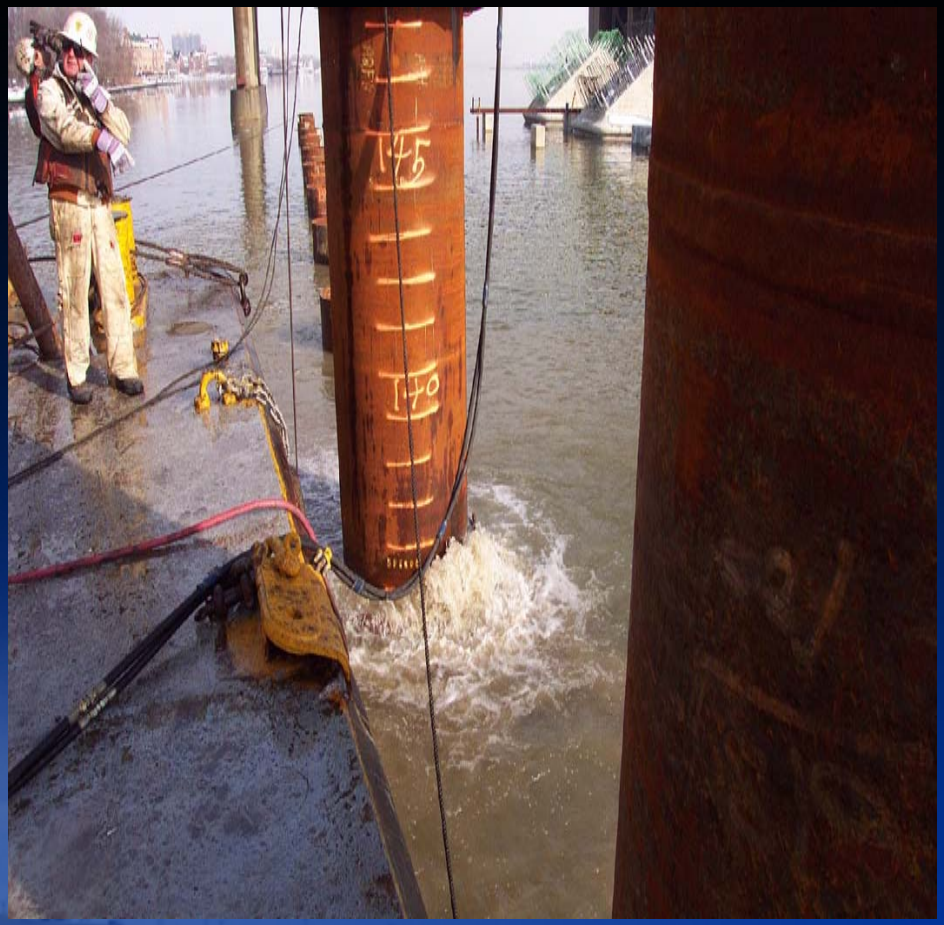
Contained Air Bubble Curtain System



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PCC, SHA, and VDOT developed special provisions for all WWB contracts with in-water pile driving.

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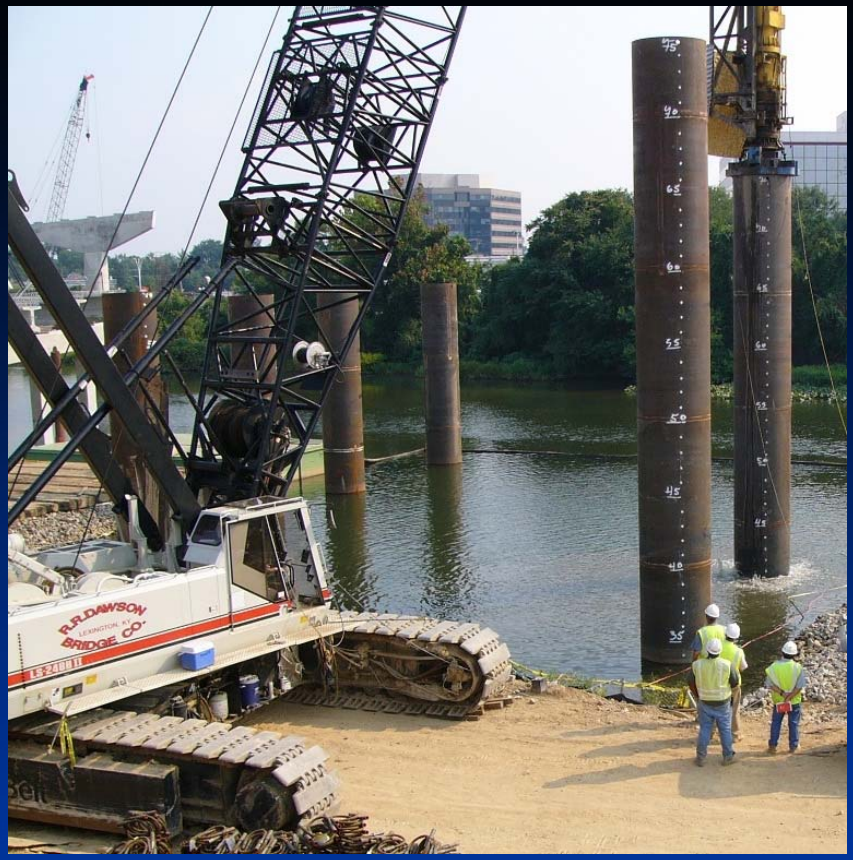
Air Bubble System on VA-5

Pressure wave reduction vs. Pressure wave avoidance

60” Steel Pipe Piles



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Contractor constructing bridges for the U.S. Route 1 Interchange Contract with Concrete and Steel Piles.

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In Summary…..

-Our results indicate that pressures of 6psi can kill fish, though many parameters will bear influence.

-While concrete piles are not problematic, driving steel pipe piles 12” in diameter can exert lethal pressure waves.

-Flooded steel cofferdams are helpful but keeping fish from the lethal zone or reducing the energy to 6psi or less is key.

-Pressure wave monitoring is key for confirming and documenting conformance.

BR-3C Contract Approach to Fish Protection for 54” Fender Ring Piles

BR-3C Contract Approach to Fish Protection for 54” Fender Ring Piles

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~QUESTIONS AND ANSWERS~